



# South Africa: Environmental Issues

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## South Africa: Environmental Issues

### Introduction

South Africa's energy sector significantly impacts local and regional environmental conditions. Coal, (mostly bituminous, with a high ash content), is the primary fuel produced and consumed in South Africa. Production and consumption of coal has serious effects on the environment, leading to air and water pollution, while also contributing to increasing concentrations of greenhouse gases in the atmosphere. South Africa also faces many of the problems experienced by other developing countries: deforestation, rapid population growth and urbanization, all of which can lead to environmental degradation.

In rural areas of South Africa, approximately three million households burn fuelwood in order to meet their energy needs. Not only can the gathering of fuelwood prove unsustainable and lead to deforestation, but also, the fuelwood frequently is burned in enclosed spaces without adequate ventilation. This can result in harmful levels of pollutants in rural homes, leading to respiratory health problems and other ailments.

With the country's first multiracial, democratic election in 1994, environmental groups began lobbying for stricter environmental laws. In October 1997, the White Paper on Environmental Management was completed. This policy was developed through the participatory process known as the Consultative National Environmental Policy Process (CONNEPP). This White Paper provides the framework for environmental policy in South Africa, and addresses such issues as air, water and marine pollution, deforestation, energy efficiency and the conservation of biodiversity.

Not only are environmental standards being established in South Africa, but environmental groups are also beginning to receive attention. Sasol, a South African coal and synthetic fuels company, had plans to develop the Sigma Northwest strip mine (located on the banks of the Vaal River). In 1999, the Save the Vaal Environment Group (SAVE) won its petition to the South African government, forcing Sasol

Mining Ltd. to exclude the Sigma North-West strip mine from its operations. The process has proven beneficial to all parties, creating a forum to discuss conflicting viewpoints concerning development and its effect on the environment. Sasol Mining and SAVE agree that it is essential to sustainably utilize the Vaal Barrage Reservoir, and that its environment is dependent on the long-term cooperation of both parties.

Section 24 of the South African Constitution ensures the right of citizens to live in a clean and healthy environment. The Department of Environmental Affairs and Tourism is the central policy-making body in South Africa. Environmental Minister Mohammed Valli Moosa recognizes the challenges facing his country, saying, "What we need is a greater emphasis on the so called 'brown' environmental issues which directly affect the living spaces of people on earth, such as proper control of pollution and waste in general".

### **Pollution**

The two major types of energy related pollution in South Africa are air and marine pollution. The industrial sector is the prime contributor to air pollution. More than 90% of South Africa's electricity is generated from the combustion of coal that contains approximately 1.2% sulfur and up to 45% ash. Coal combustion can lead to particulate matter in the air, as well as contribute to acid rain. It is estimated that around 2,000 children die annually as a result of respiratory infections caused by air pollution, the sixth largest killer of children under four in South Africa.

In addition to industrial pollution, low-level atmospheric pollution often results from coal combustion in stoves, as well as coal-heated boilers that are found in hospitals and factories. Vehicular emissions, while not nearly as significant in absolute terms as in cities such as New York, Tokyo or Los Angeles, nonetheless have a negative impact on the environment. Regulations apply to diesel-powered vehicles and are geared towards ensuring proper maintenance. Environmental Minister Valli Moosa has stated that the country's pollution levels have reached crisis proportions, and that enforcement mechanisms (i.e. fines, plant closures, jail sentences) need to be improved.

Besides coal, another major contributor to air pollution in South Africa are the country's oil refineries. Though there are only four refineries in the country, they contribute to high levels of pollution in the northern suburbs of Cape Town and southern Durban, emitting high levels of sulfur dioxide and several other chemicals known to cause health problems. Residents of low income communities have been forced to relocate due to pollution from refineries, waste sites and other major industries.

Though most townships are exposed to high levels of air pollution, South Africa lacks any legally binding air pollution regulations, only non-binding guidelines and no enforcement authority. To date, there are no government approved air testing facilities in South Africa. Local governments have done little in the way of monitoring air pollution. Of the 284 municipalities, only 131 performed air quality monitoring in 2001 and of those, only 97 took steps to assure compliance.

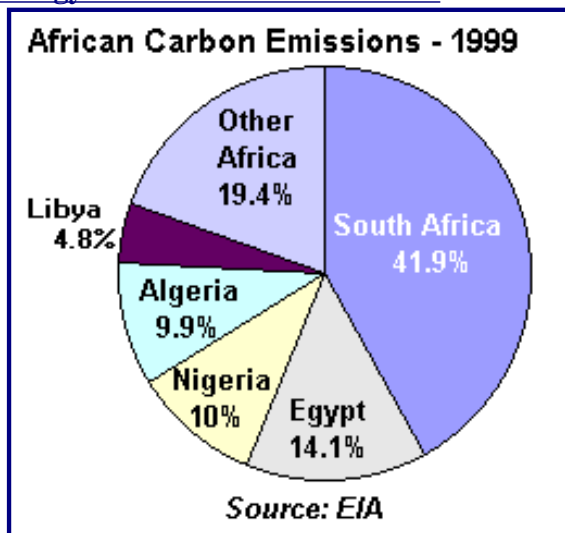
Besides air pollution, South Africa also must concern itself with energy related marine pollution. South Africa is especially vulnerable to oil spills due to the high volume of oil transported around the country's coasts by ships en route from the Middle East to Europe and the Americas. In June 2000, a tanker sank off of the coast of Cape Town, rupturing two of the ships fuel tanks. The spill threatened the South African penguin population and damaged tourist areas including the World Heritage site of Robben Island.

The South African Department of Transport and the Department of Environmental Affairs and Tourism cooperate to ensure both prevention of oil spills and clean-up in the event of accidents. Measures supported by the Department of Transport include the maintenance of at least a 12 mile distance from the South African coast, prosecution of ship owners if any oil is discharged from their

ships, control of aircraft patrols over shipping lanes, and contingency plans for any oil spills that do occur.

Pollution from mining activities is probably the most direct cause of groundwater pollution in South Africa. Furthermore, small waste coal dumps cause both pollution and safety problems, as waste coal may spontaneously ignite.

### Energy Use and Carbon Emissions



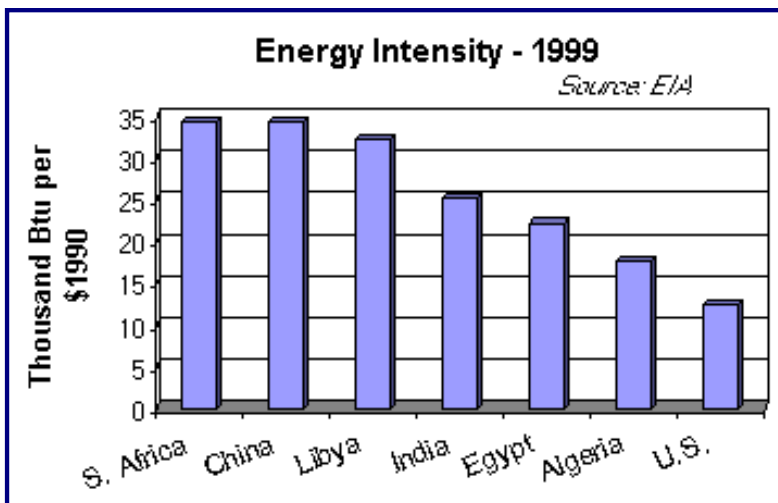
Of the 4.4 quadrillion Btu (quads) of primary energy consumed in South Africa in 1999, 74.7% was coal, 21.3% oil and 1.2% natural gas. Electricity generation is responsible for a significant portion of coal usage, with more than 90% of South Africa's electricity generated from coal. While South Africa accounts for 37.2% of the total primary energy consumed in all of Africa, in a world context, South Africa is only responsible for 1.1% of total primary energy consumption. Due to the high content of coal in the energy mix, however, South Africa's carbon emissions are proportionately greater in comparison with many other countries. In 1999, South Africa emitted 29.4 million metric tons of carbon. This amounted to 42% of Africa's energy-related carbon emissions and 1.6% of world energy-related carbon emissions.

Over the past 25 years, primary energy consumption in South Africa's residential and commercial sectors has risen only very gradually. The slow increase of primary energy consumption in the residential sector can be attributed partially to South Africa's reliance on fuelwood, a non-commercial energy source. Fuelwood is still the largest

source of household energy in remote rural populations. It is estimated that fuelwood meets the daily energy needs of more than one third of South Africa's population.

South Africa's transportation and industrial sector energy consumption and carbon emissions have exhibited a significant rise over the past 25 years. In 1998, the industrial sector consumed 2.6 quads of energy (57% of total primary energy consumption) and emitted 66.8 million metric tons of carbon (65% of total carbon emissions from fossil fuels). Meanwhile, in 1998, the transportation sector consumed 0.81 quads of energy (17.5% of total primary energy consumption) and emitted 17.9 million metric tons of carbon (17.5% of total carbon emissions).

### Energy and Carbon Intensity



Since 1970, South Africa consistently has consumed the most energy and emitted the most carbon per dollar of GDP among major countries in Africa. In 1999, South African energy intensity measured 34.5 thousand Btu per \$1990, higher than other major African energy producing countries like Algeria, Egypt and Libya, and approaching China's energy intensity of 34.5 thousand Btu per \$1990. In 1999, South Africa's carbon intensity was approximately 0.8 metric tons per thousand \$1990. This is far higher than in most other African countries. Again, this is largely due to the heavy use of coal in the South African economy.

While most countries have energy conservation regulations, energy efficiency standards in South Africa generally are lacking. While there has been recognition over the past few years of the benefits that would

accrue from the introduction of energy efficiency standards, most have not been implemented. Barriers to improvements in energy efficiency include a low-cost energy supply in coal, a lack of public awareness concerning operating costs of appliances, inadequate long-term policies, and absence of codes and standards.

In February 1999, the U.S.-South African Binational Commission Sustainable Energy Committee met and agreed to focus its efforts on improving energy efficiency, while also concentrating its attention on renewable energy, clean power generators, and natural gas technologies. New initiatives announced by this committee include:

- A pilot study to evaluate inactive power plants and potentially convert them to fluidized bed technology. This technology makes it possible to convert power from waste coal, thereby minimizing emissions.
- Efforts to commercialize ultraviolet (UV) waterworks throughout South Africa. UV waterworks is an energy efficient water purification system that utilizes UV to disinfect water.
- A motor challenge workshop to improve industrial motor efficiency

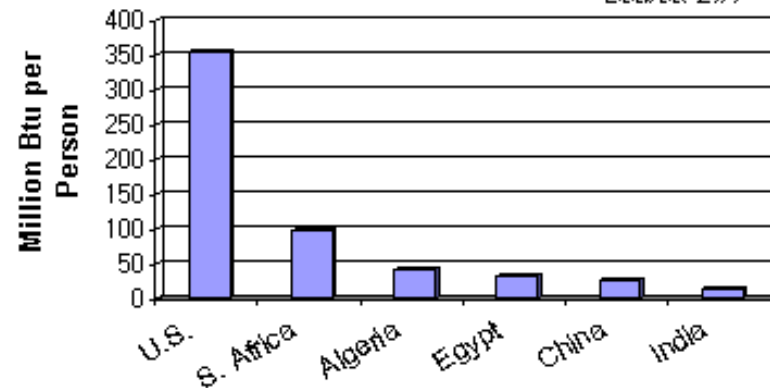
### Per Capita Energy Use and Carbon Emissions

South Africa is one of the most industrialized countries in Africa. In comparison to "developed" countries, however, South Africa has lower levels of automobile and home appliance ownership per capita, and consumes a higher proportion of "non-commercial" energy. As a result, South Africa's per capita levels of energy consumption and energy-related carbon emissions, while higher than in most of Africa, are lower than in the United States and many other developed countries.

South Africa's per capita energy consumption and per capita energy-related carbon emissions have remained fairly constant over the past two and a half decades. In 1999, per capita energy consumption in South Africa was 97.7 million Btu, while per capita energy-related carbon emissions registered 2.2 million metric tons of carbon.

**Per Capita Energy Consumption - 1999**

*Source: EIA*



### **Renewable Energy**

Historically in South Africa, incentives for investments in both energy efficient technologies and renewable energy have been minimal. Partially due to the low price of coal in South Africa, there has been little incentive for government funding or private support for renewable energy sources.

One incentive for action might be the significant percentage of the population that does not have access to grid electricity. Approximately 20% of rural populations are expected to remain without access to grid electricity over the next 20 years. Due to the dispersed nature of villages, modular, renewable energy technologies are an economically efficient and environmentally benign means of providing electricity to a larger percentage of the population. South Africa has significant solar resources, and the potential for this resource to reduce coal consumption and to provide electricity to rural villages is beginning to be exploited.

Solar power will be introduced into 50,000 homes as a result of a joint agreement between Eskom, the national power supplier of South Africa, and Shell International Renewables. A solar panel, charge-controlled battery and a metering unit can be installed in homes, without owners having to pay the large upfront costs often associated with such systems. Customers purchase a magnetic card that activates the solar home for a period of thirty days. After thirty days, customers must purchase another card to activate the system. The monthly cost to consumers will be about \$8, approximately the same amount of money that they are currently paying for less energy efficient and less sustainable fossil fuels.

South Africa participates in the Renewable Energy for African Development program (READ), which was set up in 1993 to promote cooperation between African countries and U.S. industry, government, and academia on renewable energy issues. The non-profit program promotes sustainable rural development through appropriate use of renewable energy technologies.

South Africa and Lesotho also are joining efforts during construction of the Lesotho Highlands Water Project, all five phases of which are to be completed by 2020. The purpose of the largest water supply scheme ever undertaken in Africa is to both provide needed water supplies to South Africa, and to provide hydropower to Lesotho. In 1999, South Africa consumed 80% of the region's water resources yet possesses only 10% of the region's water. Upon completion, water will be supplied to the industrial heartland of South Africa and about 180MW of electricity will be supplied to Lesotho. Environmental groups, however, fear that the large dam constructed in the Lesotho Highlands Water Project will not only force people from their homes, but submerge fertile farmland and forests and destroy valuable

fisheries and ecosystems.

### **Outlook**

South Africa is preparing to host the World Conference on Sustainable Development - Earth Summit (Rio +10) in August 2002. South African priorities for sustainable development include fighting against AIDS, working towards more access to clean drinking water, safe food, and improving the environment alongside the country's economic growth.

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